

## WHAT IS CLAIMED IS:

1           1.    A packet switch for switching cells comprising fixed-size  
2   data packets, said packet switch comprising:

3                N input ports capable of receiving and storing cells in  
4   a plurality of input queues;

5                N output ports capable of receiving and storing cells  
6   from said N input ports in a plurality of output queues;

7                a switch fabric for transferring said cells from said N  
8   input ports to said N output ports, said switch fabric comprising  
9   an internally buffered crossbar having NxN internal buffers  
10   associated therewith, wherein each internal buffer is associated  
11   with a crosspoint of one of said N input ports and one of said N  
12   output ports;

13               a scheduling controller capable of selecting a first one  
14   of a plurality of queued head-of-line (HOL) cells from said input  
15   queues to be transmitted to a first one of said NxN internal  
16   buffers according to a fair queuing algorithm in which each of said  
17   queued HOL cells is allocated a weight of  $R_{1j}$  and wherein said  
18   scheduling controller is further capable of selecting a first one  
19   of a plurality of HOL cells buffered in a second one of said NxN  
20   internal buffers to be transmitted to a first one of said output  
21   queues according to a fair queuing algorithm in which each of said

internally buffered HOL cells is allocated a weight of  $R_{ij}$ , wherein a group of  $K$  queues share a combined capacity of 1, and

$$\sum_{i=1}^K R_i \leq 1$$

where  $R_i$  is the guaranteed bandwidth associated with queue  $i$ , wherein any queue being non-empty over a time interval  $T$  can be guaranteed a bandwidth of  $R_i T + E$ , where  $E$  is a constant.

2. The packet switch as set forth in Claim 1 wherein said  $N \times N$  internal buffers are disposed within said switch fabric.

3. The packet switch as set forth in Claim 1 wherein at least some of said  $N \times N$  internal buffers are disposed within said  $N$  input ports.

4. The packet switch as set forth in Claim 1 wherein at least some of said  $N \times N$  internal buffers are disposed within said  $N$  output ports.

1           5.    The packet switch as set forth in Claim 1 wherein said  
2    NxN internal buffers are configure within said N output ports such  
3    that each output port has a fast internal speed-up of N output  
4    buffer that is shared at least partially by cells from all input  
5    ports.

1           6.    A communication network comprising a plurality of packet  
2   switches capable of transferring data in cells comprising fixed-  
3   size packets, wherein at least one of said packet switches  
4   comprises:

5                N input ports capable of receiving and storing cells in  
6   a plurality of input queues;

7                N output ports capable of receiving and storing cells  
8   from said N input ports in a plurality of output queues;

9                a switch fabric for transferring said cells from said N  
10   input ports to said N output ports, said switch fabric comprising  
11   an internally buffered crossbar having NxN internal buffers  
12   associated therewith, wherein each internal buffer is associated  
13   with a crosspoint of one of said N input ports and one of said N  
14   output ports;

15               a scheduling controller capable of selecting a first one  
16   of a plurality of queued head-of-line (HOL) cells from said input  
17   queues to be transmitted to a first one of said NxN internal  
18   buffers according to a fair queuing algorithm in which each of said  
19   queued HOL cells is allocated a weight of  $R_{ij}$  and wherein said  
20   scheduling controller is further capable of selecting a first one  
21   of a plurality of HOL cells buffered in a second one of said NxN  
22   internal buffers to be transmitted to a first one of said output

23 queues according to a fair queuing algorithm in which each of said  
24 internally buffered HOL cells is allocated a weight of  $R_{ij}$ , wherein  
25 a group of K queues share a combined capacity of 1, and

$$\sum_{i=1}^K R_i \leq 1$$

27 where  $R_i$  is the guaranteed bandwidth associated with queue i,  
28 wherein any queue being non-empty over a time interval T can be  
29 guaranteed a bandwidth of  $R_i T + E$ , where E is a constant.

1 7. The communication network as set forth in Claim 6 wherein  
2 said NxN internal buffers are disposed within said switch fabric.

1 8. The communication network as set forth in Claim 6 wherein  
2 at least some of said NxN internal buffers are disposed within said  
3 N input ports.

1 9. The communication network as set forth in Claim 6 wherein  
2 at least some of said NxN internal buffers are disposed within said  
3 N output ports.

1           10. The communication network as set forth in Claim 6 wherein  
2   said NxN internal buffers are configure within said N output ports  
3   such that each output port has a fast internal speed-up of N output  
4   buffer that is shared at least partially by cells from all input  
5   ports.